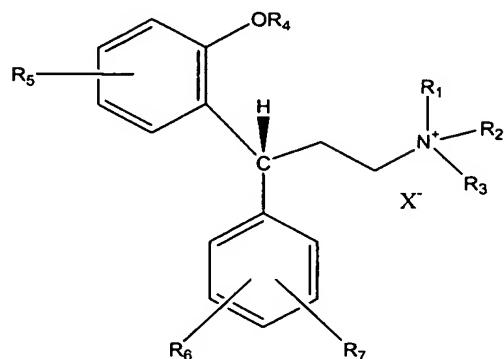


We Claim:

1. A quaternary ammonium compound of the formula



5 or a stereoisomer thereof, wherein

R_1 , R_2 and R_3 are independently C_1 - C_6 -alkyl, C_3 - C_7 -cycloalkyl, C_3 - C_6 -alkenyl, C_4 - C_8 -cycloalkenyl, and C_3 - C_6 -alkynyl, wherein at least one of R_1 , R_2 and R_3 contains an unsaturated carbon-carbon bond, and any two of R_1 , R_2 and R_3 may form a ring together with the quaternary ammonium nitrogen, and the ring formed from any two of R_1 , R_2 and R_3 may optionally contain an internal or exocyclic carbon-carbon double bond, and the ring formed from any two of R_1 , R_2 , and R_3 may additionally be substituted with one to three C_1 - C_4 alkyl, C_2 - C_4 alkenyl, C_3 - C_6 alkynyl, aryl, halo, hydroxy, alkoxy, amino or carboxyl;

R_4 is

15 $-H$,

$-CH_3$, or

$-CO-R_{4-1}$ wherein R_{4-1} is

$-(C_1-C_4$ alkyl),

$-(C_1-C_4$ alkoxy), or

20 $-NR_{4-2}R_{4-3}$, wherein R_{4-2} and R_{4-3} are independently $-H$ or $-(C_1-C_4$ alkyl);

and

R_5 , R_6 and R_7 are independently

$-H$,

25 $-OCH_3$,

$-OH$,

$-CONH_2$,

-SO₂NH₂,
-F, -Cl, -Br, -I,
-CF₃, or
-(C₁-C₄ alkyl), optionally substituted with one or two

5 -OH,
-(C₁-C₄ alkoxy),
-COOH, or
-CO-O-(C₁-C₃ alkyl), and

X⁻ is an anion of a pharmaceutically acceptable acid.

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2. A quaternary ammonium compound according to claim 1, wherein the carbon stereocenter is (R).

15 3. A quaternary ammonium compound according to claim 1, wherein the carbon stereocenter is (S).

4. A quaternary ammonium compound according to claim 1, which is a mixture of stereoisomers.

20 5. A quaternary ammonium compound according to claim 1, wherein at least one of R₁, R₂ and R₃ is C₂-C₅ alkenyl.

6. A quaternary ammonium compound according to claim 5, wherein at least one of R₁, R₂ and R₃ is allyl.

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7. A quaternary ammonium compound according to claim 6, wherein at least two of R₁, R₂ and R₃ is allyl.

30 8. A quaternary ammonium compound according to claim 5, wherein at least one of R₁, R₂ and R₃ is methyl.

9. A quaternary ammonium compound according to claim 5, wherein at least one of R₁, R₂ and R₃ is ethyl.

10. A quaternary ammonium compound according to claim 1, wherein R₁ and R₂ jointly form a ring together with the quaternary ammonium nitrogen.

5 11. A quaternary ammonium compound according to claim 10, wherein said ring comprises from 4 to 8 carbon atoms.

12. A quaternary ammonium compound according to claim 1, wherein R₄ is -H, -CH₃, or -CO-R₄₋₁, wherein R₄₋₁ is C₁-C₄ alkyl.

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13. A quaternary ammonium compound according to claim 12, wherein R₄ is -H.

14. A quaternary ammonium compound according to claim 1, wherein R₅ is -H, -Br, -Cl, -CH₃, or -CH₂OH.

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15. A quaternary ammonium compound according to claim 14, wherein R₅ is -CH₃.

16. A quaternary ammonium compound according to claim 1, wherein at least one 20 of R₆ and R₇ is -H.

17. A quaternary ammonium compound according to claim 1, wherein both R₆ and R₇ represent -H.

25 18. A quaternary ammonium compound according to claim 1, wherein X⁻ is selected from the group consisting of the anions of the following acids: tartaric, hydrochloric, hydrobromic, hydroiodic, sulfuric, phosphoric, nitric, citric, methanesulfonic, CH₃-(CH₂)_n-COOH where n is 0 thru 4, HOOC-(CH₂)_n-COOH where n is 1 thru 4, HOOC-CH=CH-COOH and benzoic.

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19. A quaternary ammonium compound according to claim 18, wherein X⁻ is selected from the group consisting of iodide, bromide and chloride.

20. A quaternary ammonium compound according to claim 19, wherein X⁻ is iodide.

21. A quaternary ammonium compound according to claim 19, wherein X⁻ is 5 chloride.

22. A quaternary ammonium compound according to claim 19, wherein X⁻ is bromide.

10 23. 1-[3-(2-Hydroxy-5-methylphenyl)-3-phenylpropyl]-1-(2-methylprop-2-enyl)pyrrolidinium bromide;

1-[3-(2-hydroxy-5-methylphenyl)-3-phenylpropyl]-1-(3-methylbut-2-enyl)pyrrolidinium bromide;

15 1-allyl-1-[3-(2-hydroxy-5-methylphenyl)-3-phenylpropyl] pyrrolidinium iodide;

1-allyl-1-[3-(2-hydroxy-5-methylphenyl)-3-phenylpropyl] pyrrolidinium chloride;

3-(2-hydroxy-5-methylphenyl)-N,N-diallyl-N-methyl-3-phenyl propan-1-aminium iodide;

20 3-(2-hydroxy-5-methylphenyl)-N,N-diallyl-N-ethyl-3-phenylpropan-1-aminium iodide;

1-allyl-1-[3-(2-hydroxy-5-methylphenyl)-3-phenyl propyl]piperidinium chloride; or

25 3-(2-hydroxy-5-methylphenyl)-N,N,N-triallyl-3-phenylpropan-1-aminium bromide.

24. A pharmaceutical composition comprising a therapeutically effective amount of a quaternary ammonium compound according to claim 1, and a suitable pharmaceutical carrier therefor.

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25. A method of treating asthma in a mammal, said method comprising administering to said mammal, in need of such a treatment, a therapeutically effective amount of a quaternary ammonium compound according to claim 1.

26. A method of treating chronic obstructive pulmonary disease (COPD) in a mammal, said method comprising administering to said mammal, in need of such a treatment, a therapeutically effective amount of a quaternary ammonium compound
5 according to claim 1.

27. A method of treating allergic rhinitis in a mammal, said method comprising administering to said mammal, in need of such a treatment, a therapeutically effective amount of a quaternary ammonium compound according to claim 1.

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28. A method of treating urinary disorder in a mammal, said method comprising administering to said mammal, in need of such a treatment, a therapeutically effective amount of a quaternary ammonium compound according to claim 1.

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29. A method of treating rhinorrhea due to the common cold in a mammal, said method comprising administering to said mammal, in need of such a treatment, a therapeutically effective amount of a quaternary ammonium compound according to claim 1.

20 30. A method of claim 25 wherein said mammal is a human.

31. A method of claim 26 wherein said mammal is a human.

32. A method of claim 27 wherein said mammal is a human.

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33. A method of claim 28 wherein said mammal is a human.

34. A method of claim 29 wherein said mammal is a human